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The purpose of this study was to develop a reliable and valid instrument that conveniently measures a person's attitude toward computers. The final version of the instrument is composed of 40 items on a Likert-type scale which assign scores to subjects on their "appreciative" and "critical" attitude toward computers. The sample included 410 undergraduate students at four universities (in Arkansas, Mississippi, Tennessee and Pennsylvania) enrolled in education, liberal arts or computer science courses. They were primarily 18-22 years of age (67 percent) and female (60 percent). The responses were initially factor analysed by the principal components method. Since pilot research suggested that a two-factor solution provided the most homogeneous grouping of items, rotational procedures employed only the first two factors which accounted for one third of the total variance. The two factors were rotated to both varimax and oblique solutions. The pattern of item-to-factor correlation suggested that all the items tended to be associated with one and only one factor. An examination of the item loadings suggested that the instrument possesses high face validity. Reliability was assessed by means of split-half correlation and internal consistency. (Author)

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MEASURING ATTITUDE TOWARD COMPUTERS: THE COMPUTER APPRECIATOR-CRITIC ATTITUDE SCALES

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Attitudes are evaluative beliefs. They are likes and dislikes. They are our affinities for and our aversion to situations, objects, persons, groups or any identifiable aspects of our environment. Our likes and dislikes have roots in our cognition, in our emotions, in our behavior and in the social influences upon us (Bem, 1970). Attitudes first were formally studied in 1918 when Thomas and Znaniecki defined social psychology as the study of attitudes. People have attitudes for many reasons. Attitudes help us understand our world by organizing and simplifying input from our environment, and they allow us to express our fundamental values (Triandis, 1971).

The year 1946 was the beginning of the Computer Age. It was then that the first electronic computer was built by Mauchley and Eckert at the Moore School of Engineering of the University of Pennsylvania. In the beginning of the Computer Age most human attitudes toward this new technology ranged from the naive to the irrational: "It's an amusing toy", "a mechanical man", "a superhuman brain", "It's God-like", "a tool of the devil" (Mathews and Reifers, in press). But in 1977, just six years ago, computers really did become amusing toys when the Tandy Corporation marketed the first complete personal computer, the TRS-80, for under $600. Today there are millions of computers in use in the United States alone. As IBM reminded us: "It was to have been the Nuclear Age. It became the Computer Age."

During the three dozen years of the Computer Age we have witnessed the progressive computerization of our society. Our world

is dependent upon computers, with little chance of trend reversal. The Industrial Revolution provided technology that supplemented the muscles of humankind--and brought with it enormous problems. The Computer Age is providing technology that supplements the mind of humankind--and it too brings social problems...problems of a magnitude previously incomprehensible: problems concerning individuality, privacy, power and automation. And with the computer becoming ubiquitous (not just an identifiable entity, but also as an invisible component of other technology) it has become the prime symbol of our rapidly changing world. Without being given a choice, many people have computers thrust on them in the workplace, the marketplace and even the home. But how do these individuals feel? What is their attitude toward computers?

The pervasiveness of computers today demands that we study societal attitudes towards computers for at least two reasons: First, to better understand and correct the fallacious and often irrational attitudes toward this integral component of modern life, and second, to better understand the rational attitudes against computers and their uses so that the individual and society may be protected.

The purpose of this study was to develop a reliable and valid instrument that conveniently measures a person's attitude toward computers. The final version of the instrument is composed of 40 items on a Likert-type scale which assign scores to subjects on their "appreciative" and "critical" attitude toward computers.

The sample included 410 undergraduate students at four

universities (in Arkansas, Mississippi, Tennessee and Pennsylvania) enrolled in education, liberal arts or computer science courses. They were primarily 18-22 years of age (67%) and female (60%).

The responses to the 40 items of the instrument were initially factor analysed by the principal components method using the criterion of eigenvalues greater than unity to extract factors for rotation. Nine factors were extracted in this manner. Since pilot research suggested that a two-factor solution provided the most homogeneous grouping of items, rotational procedures employed only the first two factors. The two unrotated factors accounted for one third of the total variance.

The two factors were rotated to both varimax and oblique solutions. The pattern of item-to-factor correlation suggested that all the items tended to be associated with one and only one factor when an absolute value cutoff of 0.35 was employed. The correlation between the two factors on the oblique solution was -0.40.

An examination of the item loadings suggested that the instrument possesses high face validity. All items on which agreement would suggest a positive or appreciative attitude toward computers loaded on the 20 items of the first factor. Items on which agreement suggested a negative or critical attitude toward computers loaded on the 20 items of the second factor. Table I groups the items according to their major loadings which are indicated in parentheses.

Reliability was assessed on the two factor scales by means of split-half correlation and internal consistency . The correlation

between split halves of the first factor (Appreciative attitude) was 0.74. The Spearman-Brown coefficient which predicts the increase of reliability from a hypothesized increase in the number of items was 0.85. Coefficient Alpha for the first factor was 0.88. Split-half correlations on the second factor (Critical attitude) was 0.78 which increased to 0.87 with the Spearman Brown formula. Coefficient Alpha was 0.89 for the second factor.

Scale scores for the factors were obtained by summing the unweighted responses of the five point Likert-type scale items. On Factor I (Appreciative) the mean scale score was 48.00 with a standard deviation of 10.59. The average item mean on this factor was 2.40 with a range of 1.79 to 2.98. The mean scale score for Factor II (Critical) was 65.70 with a standard deviation of 11.44. The average item mean was 3.29 with a range of 2.62 to 3.90.

To evaluate the effect of sex on attitudes toward computers, females and males were compared on the scale scores. On Factor I females responded in a manner that suggested a more appreciative attitude (females=49.00+9.19, males=46.44+12.28, t=2.28, df=284.57, p 0.05). No sex differences were observed on Factor II suggesting that males and females did not differ in terms of a critical attitude (females=66.36+11.10, males=64.97+11.80, n.s.).

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Mathews, Walter M. and Reifers, Kaye. "The Computer in Cartoons: A Retrospective from the Saturday Review", Communications of the ACM (in press).

Thomas, W.I. and Znaniecki, F. The Polish Peasant in Europe and America. Chicago: University of Chicago Press, 1918.

Triandis, C. Attitude and Attitude Change. New York, NY: Wyle, 1971.

TABLE I

FACTOR I-APPRECIATIVE ATTITUDE

13. Our lives will continue to be better because of computers. (0.73)
12. The world is better because of computers. (0.72)
17. Computers mean progress. (0.68)
40. Computers are really necessary. (0.67)
31. Computers are making our lives better. (0.67)
29. Computers are improving out lives. (0.66)
4. Computers help us achieve what we want. (0.61)
2. Computers really help us. (0.61)
1. Life would not go as well without computers. (0.60)
9. We need computers. (0.58)
16. I appreciate computers. (0.58)
11. The solution to our problems lies in improved technology. (0.55)
33. The solution to our problems lies in more technology (0.54)
25. My knowledge of what is going on in the world is more up-to-date because of computers. 0.66)
20. By doing tedious tasks computers allow people to do more creative work. (0.47)
23. Technology has solved some of the world's major problems. (0.47)
39. Large computerized information files enable businesses to run more effectively. (0.45)
24. Computers simplify life. (0.44)
32. Many of the services we take for granted would not be possible without computers.(0.43)
19. Computers have helped improve the quality of products. (0.40)

FACTOR II-CRITICAL ATTITUDE

27. Computers are decreasing our freedom. (0.70)
22. Computers have too much control over peoples lives. (0.69)
37. We are becoming too dependent on computers. (0.67)
14. The amount of control computers have over our lives leaves me with a feeling of powerlessness. (0.64)
15. Computers allow businesses to take advantage of us. (0.63)
30. Our freedom is being limited by computers. (0.63)
21. Technology is changing our lives too rapidly. (0.62)
28. People are becoming too dependent on computers (0.60)
18. Computers represent a real threat to privacy. (0.60)
36. Sometimes I feel I have no more meaning too society than a pack of computer cards. (0.60)
35. My life has been over-complicated by computers. (0.57)
10. Computers reduce people to "numbers". (0.54)
3. Technology will cause the destruction of the human race. (0.50)
34. Because of computerized information files, too many people have information about other people. (0.50)
26. Because of technology I have less time to do the things I enjoy. (0.57)
6. Technology has complicated my life needlessly. (0.47)
38. The number of "computer errors" is larger than most people think. (0.44)
7. Technological advancements are spoiled by the social problems they create. (0.43)
8. We no longer completely control computers. (0.40)
5. Computers in the home will create problems. (0.39)

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